

(12) UK Patent Application (19) GB (11) 2 312 591 (13) A

(43) Date of A Publication 29.10.1997

(21) Application No 9608298.7

(22) Date of Filing 22.04.1996

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(51) INT CL⁶

H04M 11/08, H04M 1/00, H04N 1/21

(52) UK CL (Edition O)

H4K KBHX KF42

(56) Documents Cited

US 5262860 A
JAPIO ABSTRACT ACCESSION NO. 05015213 &
JP070307813

(58) Field of Search

UK CL (Edition O) H4K KBHX KBNX KBX KF42
INT CL⁶ H04H 1/00, H04M 11/00, H04N 1/21
ON-LINE : WPL, INSPEC, JAPIO

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(74) continued overleaf

(54) Automatically connecting TV viewers to information services

(57) A television viewer is automatically connected over a telephone network 20 to an information service 22 associated with or related to the television program being viewed. A control unit 34 produces a control signal in response to a viewer actuated button. Data encoded in a non-visual part of the television signal is recovered by a decoder 15. The data may relate to the telephone number of the information service 22 or to the identification of the information required from the service 22. An automatic dialer 14 connects to the network 20 and dials a telephone number in response to the viewer actuated button being pressed. The identity of the TV channel being viewed may be sent to the information service 22 so that the service can determine what information the viewer requires. A communication control system relays information between the information service 22 connected to over the telephone network 20 and the viewer. The communication between the information service 22 and the viewer may be voice and/or data communication, with text data being displayed on the viewer's TV screen 28 and the viewer's command inputs being entered from the control unit 34. The viewer may alternatively leave a message at the service 22 instead of retrieving information from it. The invention has application in cable, satellite and broadcast television, the additional information being found on any of a separate data channel, a non-visual part of the signal or a vertical blanking interval.

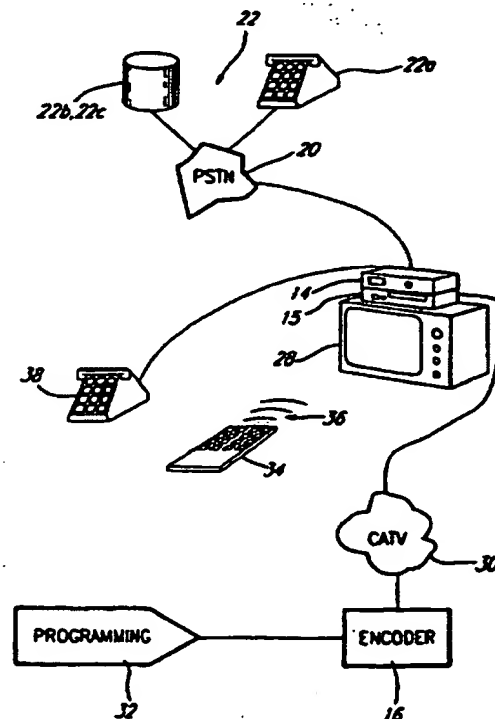


FIG. 5

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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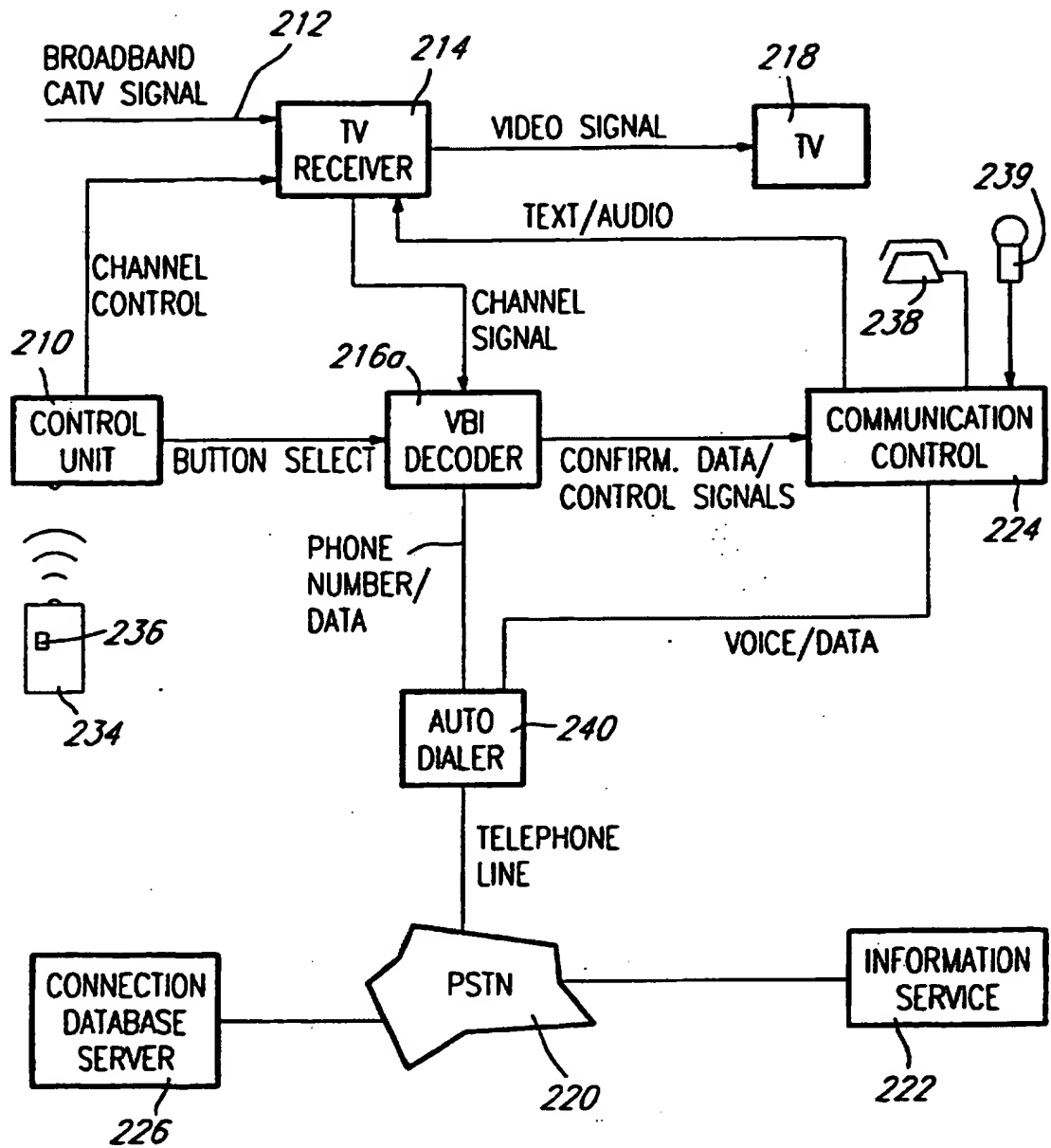
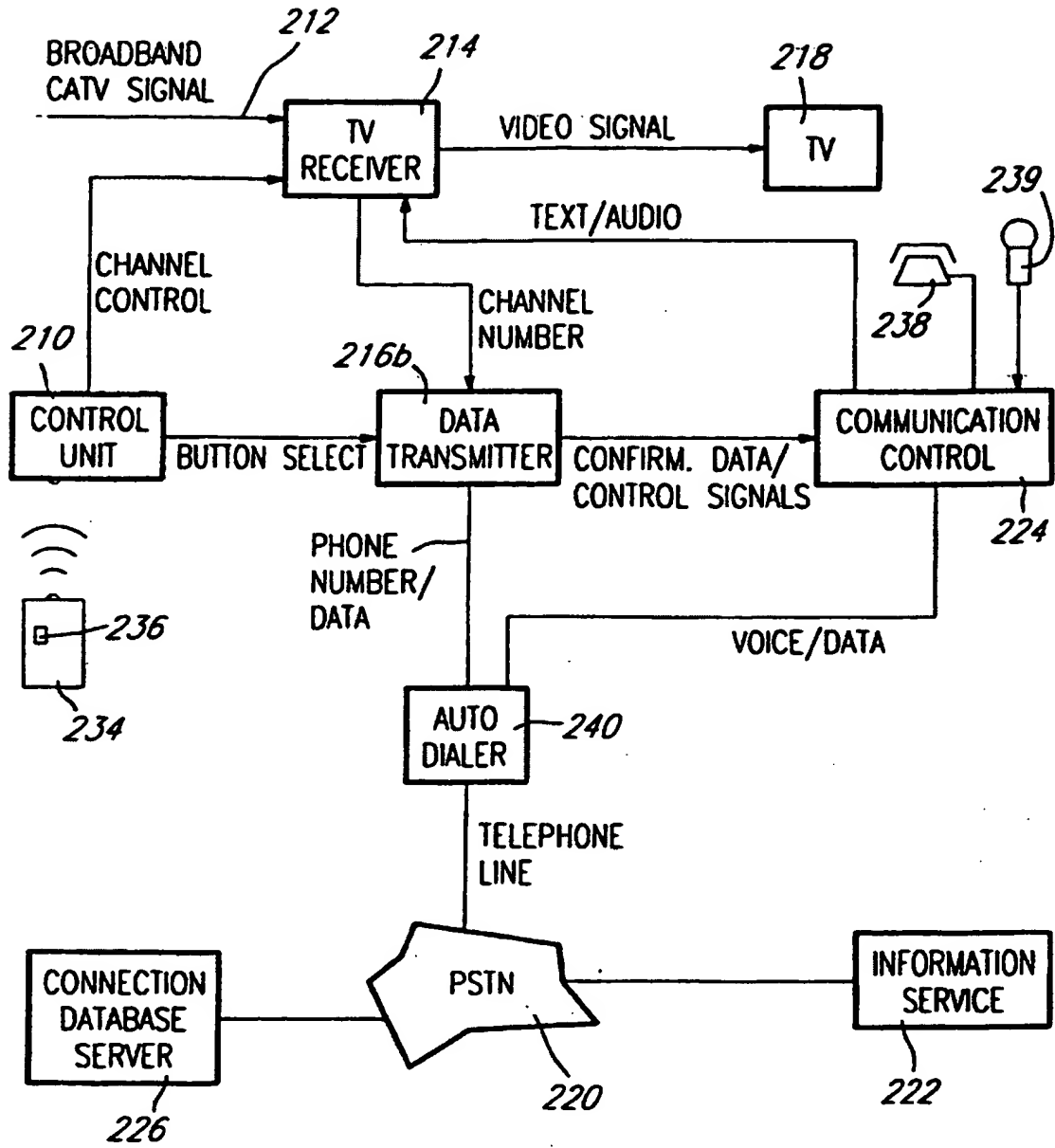
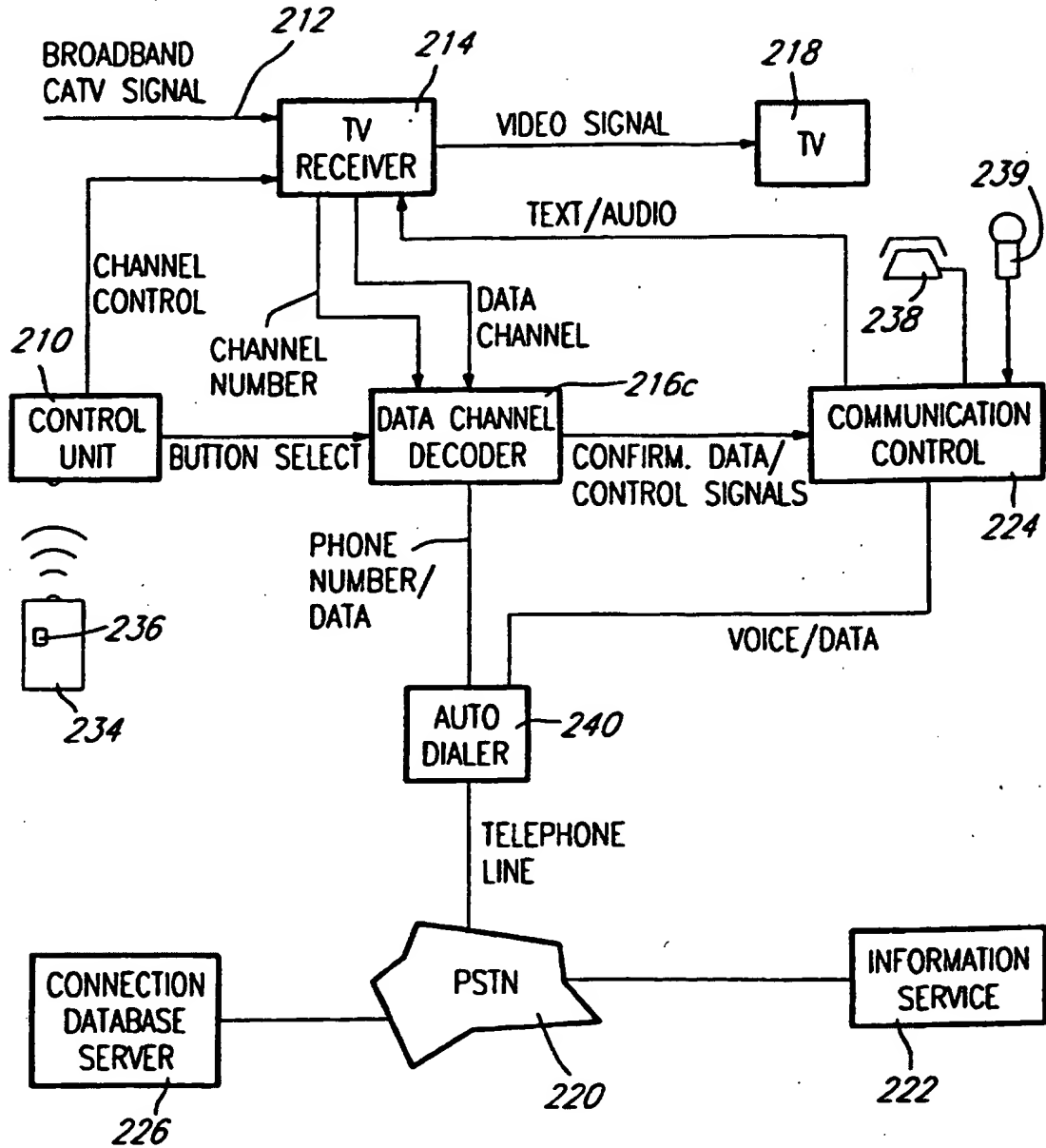


FIG. 1





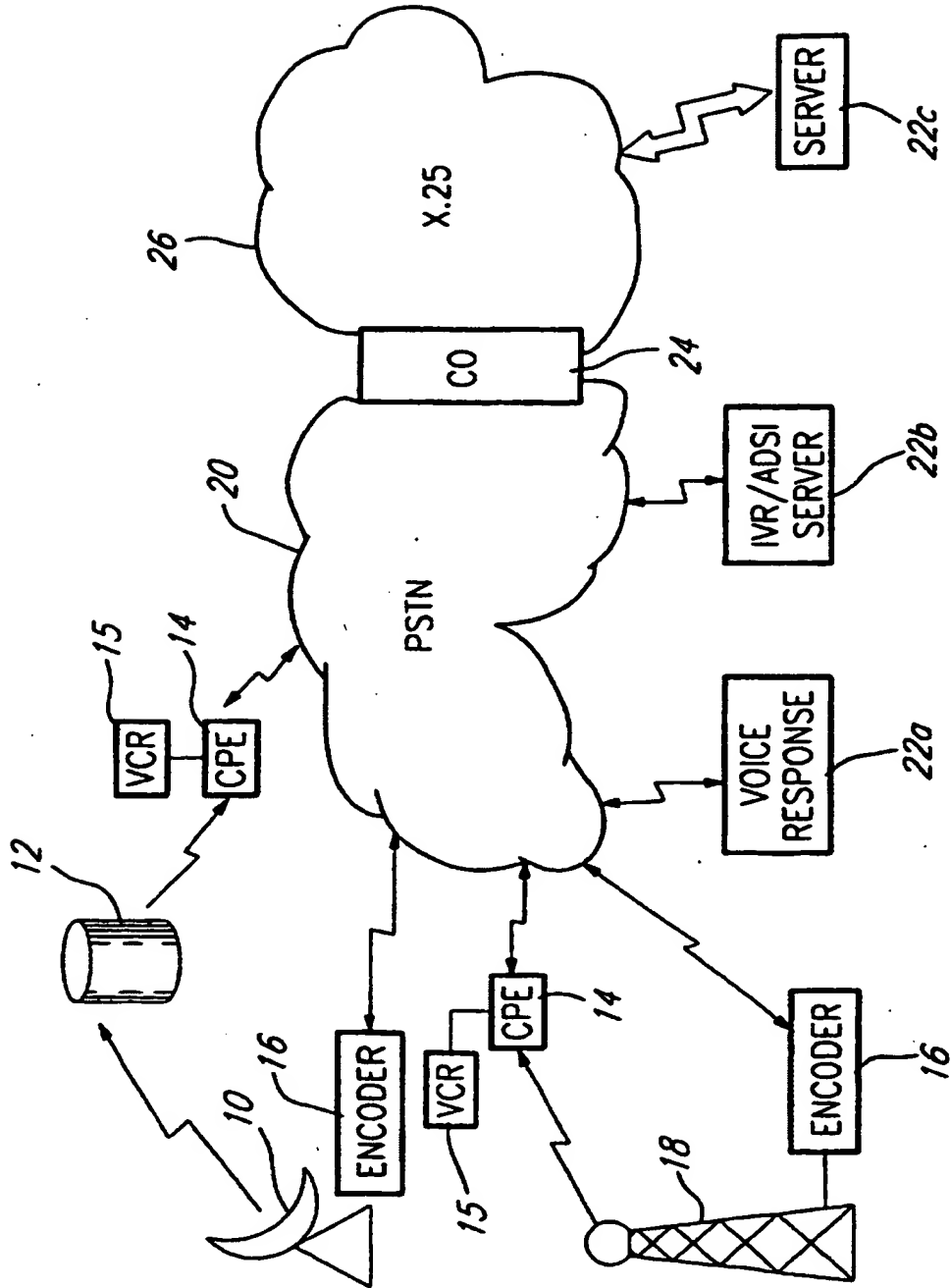


FIG. 4

5/9

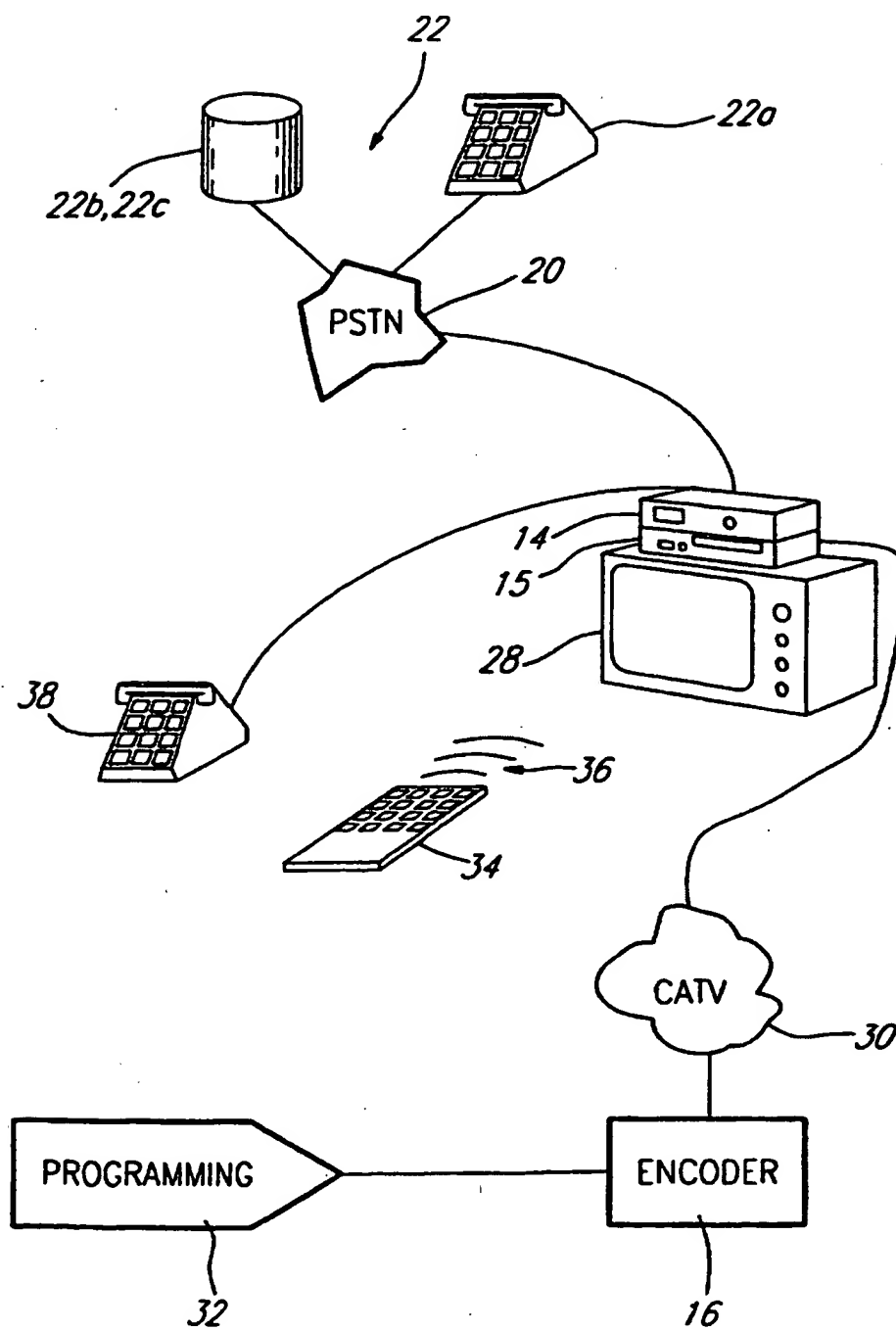


FIG. 5

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36

34

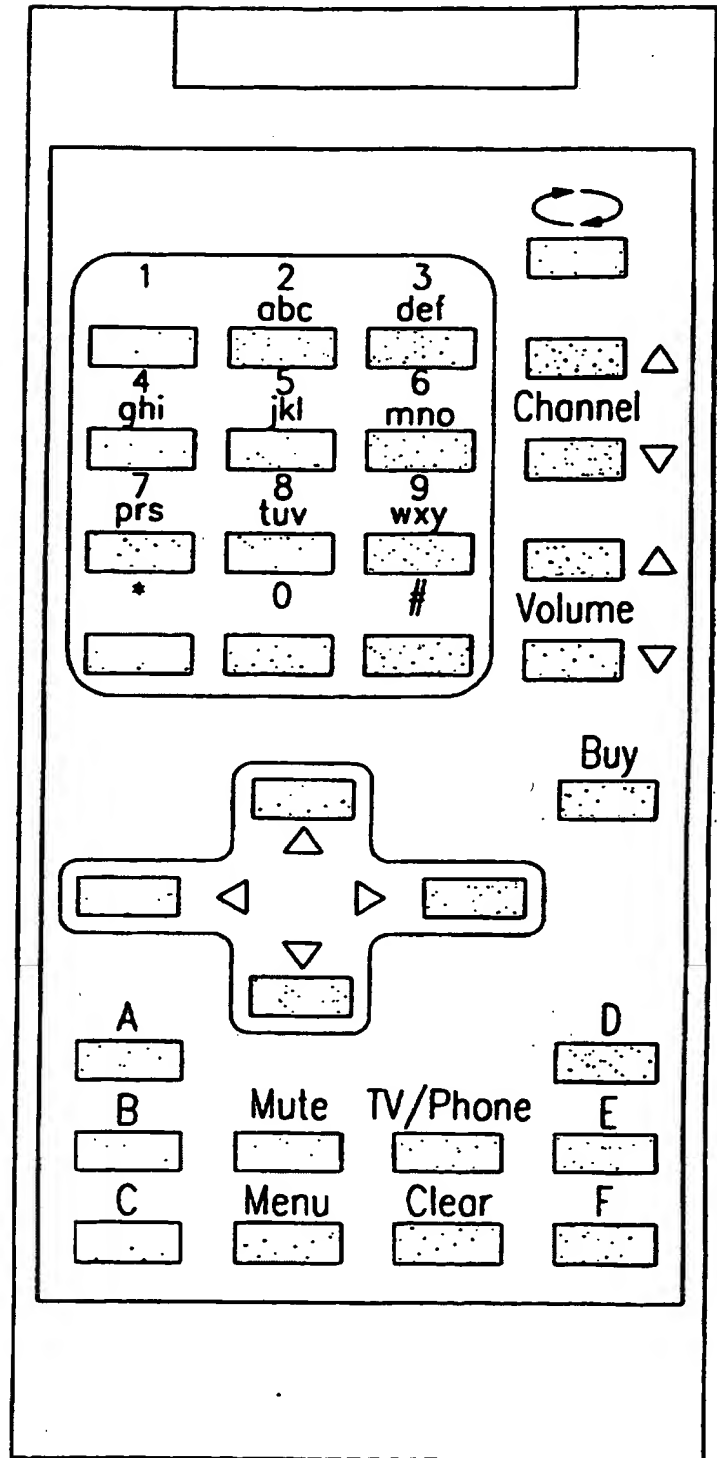


FIG. 6

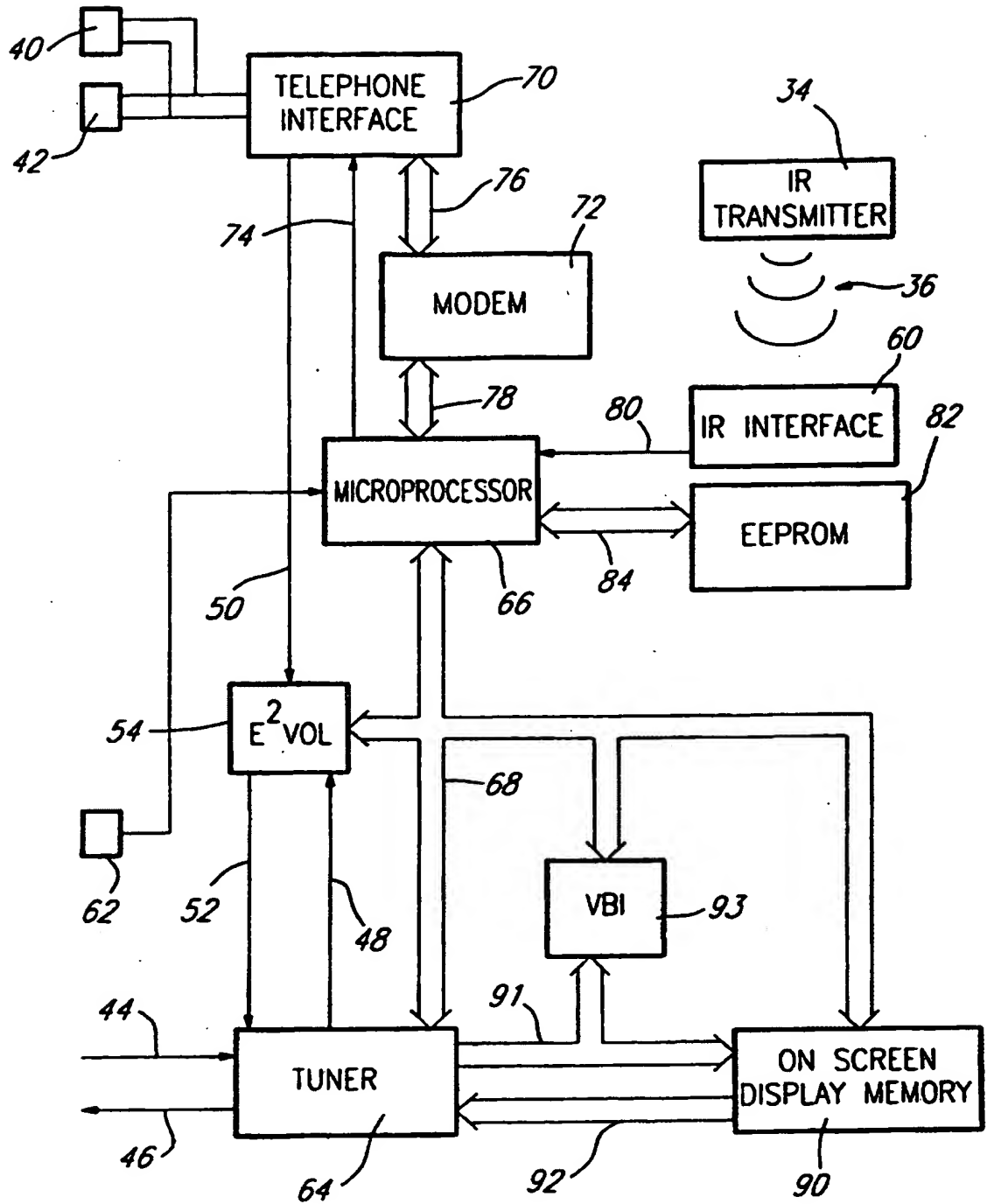
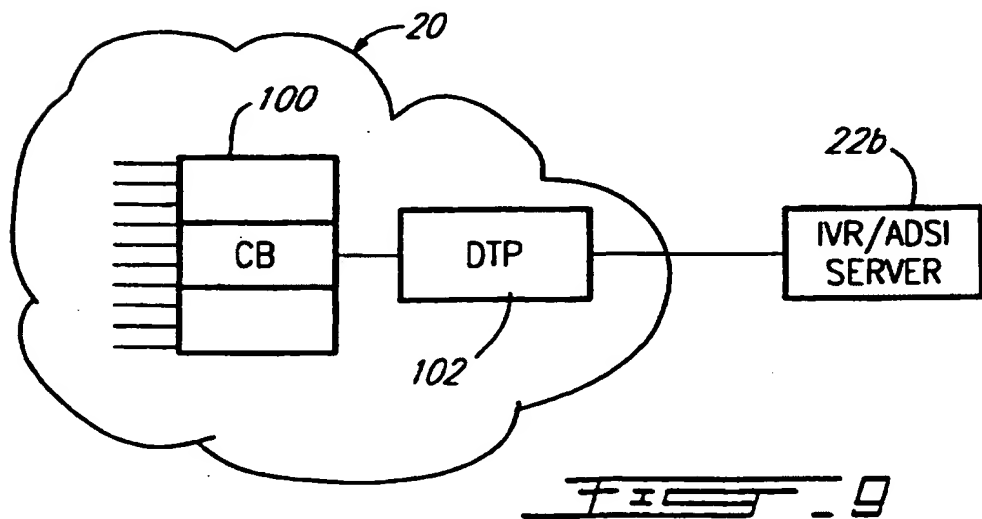
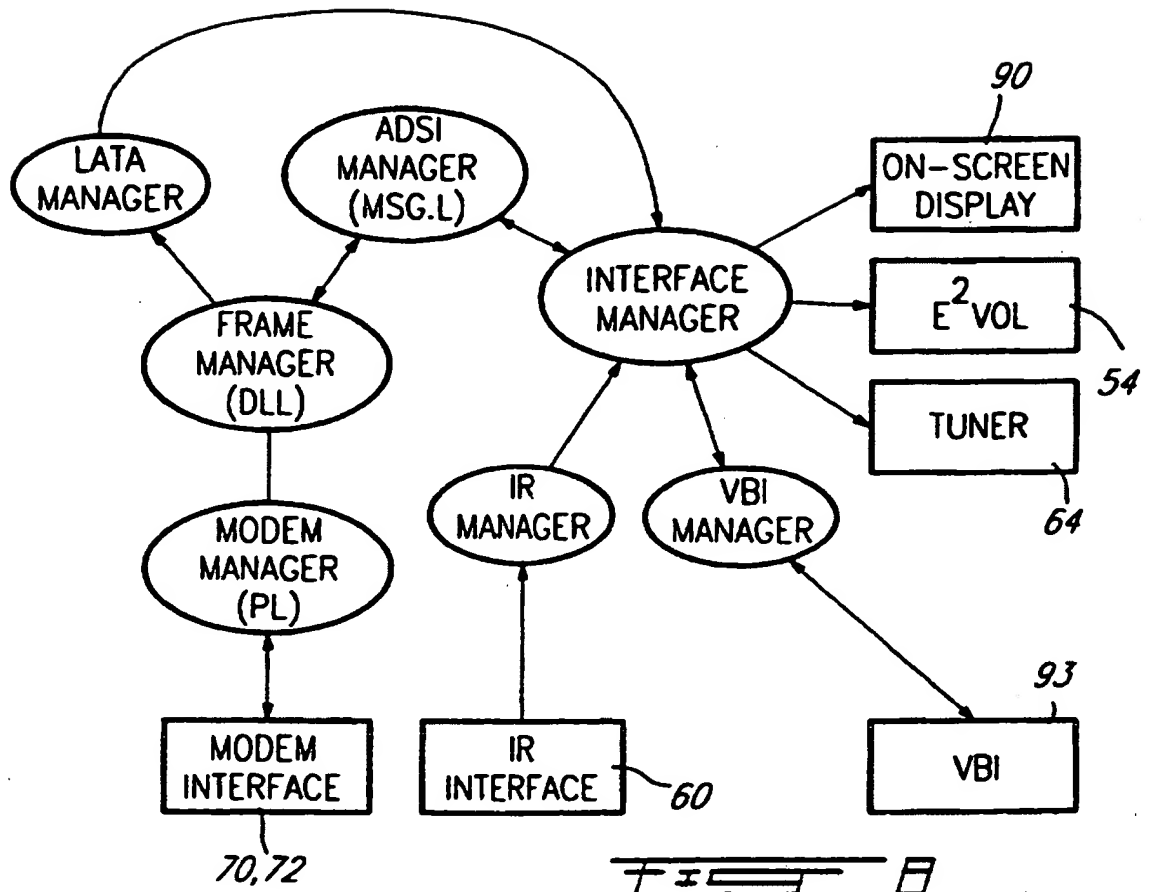
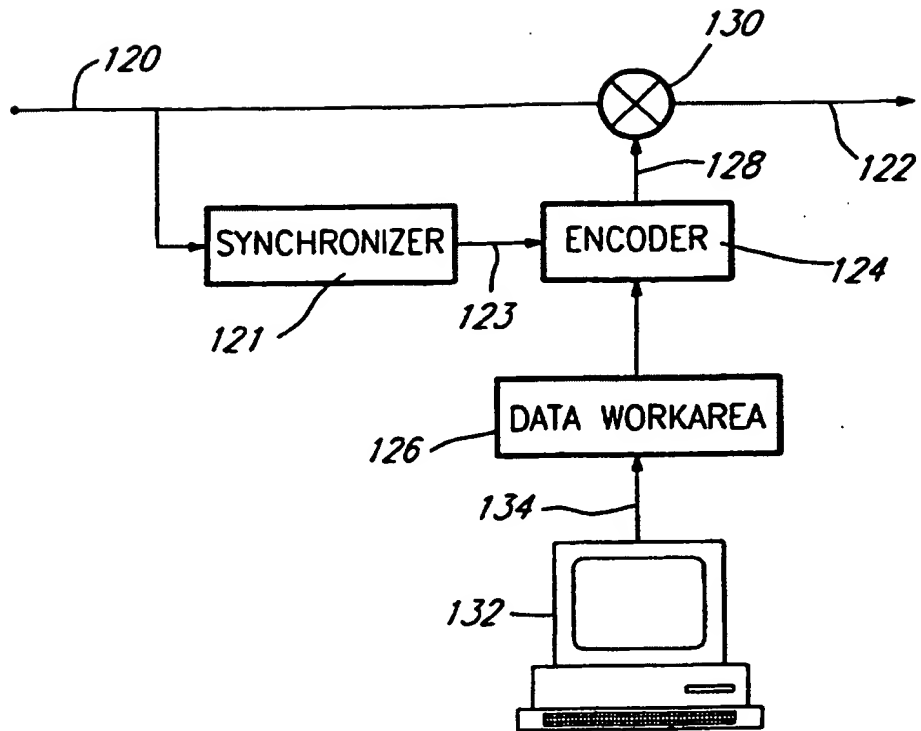


FIG. 7

8/9



FIG. 10

2312591

APPARATUS FOR INTERCONNECTION OF TV AND
INFORMATION SERVICE THROUGH TELEPHONE NETWORK

5 The present invention relates to automatically
connecting a television viewer to an information
service over telephone lines in response to a viewer's
selection made while viewing a television program.

10 Systems have been developed to use television
communication as an efficient way to guide viewers to
a point where they are ready to establish new
communication as a result of the information they have
15 seen on the television. For example, a television
program or commercial advertisement displays a
telephone number during the program and the number can
be called for further information. This has been
common practice for decades and works well, provided
20 that the television viewer mentally notes or writes
down the telephone number and is able to go to a
telephone to dial the number and receive the further
information or make the necessary inquiry.

 In U.S. Patent 5,262,860 (Fitzpatrick et al), a
25 computer is used to analyze a broadcast television
video signal to recognize and decode text or numeric
data contained within the video frames and establish
telephone communication (modem communication) based on
a captured telephone number. In U.S. Patent 4,071,697
30 (Bushnell et al), an interactive home shopping system
is disclosed in which blocks of digital information
are encoded in the RF signal. This digital
information describes the character set so that when
it is decoded, text may be recovered. Each block of
35 digital information has a unique address. The blocks
of digital information relate to specific products and
the signal broadcast on a television channel is not a

video program that can be watched for entertainment or educational purposes. U.S. Patent 4,456,925 (Skerlos et al) describes a television system having an integrated telephone with automatic dialing and a
5 memory bank of telephone numbers.

It is an object of the present invention to provide a system which allows a television viewer to
10 be quickly and easily connected to an information service while watching a program. The information used to connect the viewer over telephone lines can come from different sources and does not interfere with regular video program viewing. The information
15 service may be for product information for retail sales.

The connection to the information service can be by regular audio telephone communication or by data communication to a digital data server, or a mixture
20 of both.

According to the invention, there is provided an apparatus for automatically connecting a television viewer to an information service via a telephone network, comprising: a control unit for producing a
25 control signal, the control unit having a viewer actuated button; decoder means adapted to be connected to a tuned channel of a TV receiver receiving a television signal to be viewed by the viewer for continuously detecting and recovering data encoded in
30 a non-visual part of the television signal; automatic dialing means for automatically connecting to the network and dialing a telephone number, the telephone number being based on the recovered data; and communication means for relaying information between
35 the service and the viewer when connected to the network.

The non-visual part of the television signal is preferably the vertical blanking interval (VBI) of the NTSC signal. Preferably, the recovered data is encoded when received and is decoded and verified to assure that the recovered data is a bona_fide telephone number for dialing by the automatic dialing means.

According to the invention, there is also provided an apparatus for automatically connecting a television viewer to an information service via a telephone network, comprising: a control unit for producing a control signal, the control unit having at least one viewer actuated button; decoder means adapted to be connected to a tuned channel of a TV receiver receiving a television signal to be viewed by the viewer for continuously detecting and recovering data encoded in a non-visual part of the television signal; automatic dialing means for automatically connecting to the network and dialing a predetermined telephone number, the predetermined number being for a data server; data transmission means for sending data based on the recovered data over the telephone network to the server, the server determining which information service should be connected to over the network based on the data sent, and for establishing further communication with the information service; communication means for relaying information between the service and the viewer during the further communication.

The data transmission means may comprise a modem for sending data to the connection data data base server to obtain the right telephone number for the information service. The data transmission means when connected to the data server can send information about the channel which was being viewed when the viewer pressed the viewer actuated button for information and how many seconds ago it was when the

user pressed the button, and based on such information, the data server can determine the precise telephone number which the viewer wishes to call to be connected to the right information service.

5 The invention further provides an apparatus for automatically connecting a television viewer to an information service via a telephone network, comprising: a control unit for producing a control
10 actuated button; means adapted to be connected to a TV receiver receiving a television signal for detecting a program channel viewed by the viewer; data channel tuning means for tuning to a data channel of the television signal and for detecting and recovering
15 data encoded in a signal of the data channel, said data corresponding to said channel viewed; automatic dialing means for automatically connecting to the network and dialing a telephone number, the telephone number being based on the recovered data; and
20 communication means for relaying information between the service and the viewer when connected to the network.

 The data channel is preferably a channel dedicated to transmitting digital information and may
25 be a channel tunable by the TV receiver and is preferably broadcast over cable. The data channel decoder could have its own tuner and be permanently connected to receive the data channel and decoded information, or the TV receiver can quickly change
30 channels to the data channel for an instant when the control unit recognizes that the viewer actuated button is pressed, and the TV receiver can provide the data channel decoder with the channel number being viewed. The data channel decoder extracts the
35 information relevant to the channel being viewed at the particular point in time when the button is pressed and makes this decoded telephone number

available to the automatic dialing means. Preferably, the data extracted from the data channel includes text about the selection made by the viewer, and the communication means displays on the viewer's television screen a confirmation question to confirm that the viewer wants to be connected to the selected information service. In response to confirmation by the viewer, the communication means causes the number to be dialed by the automatic dialing means and then further relays information between the information service and the viewer when connected through the telephone network.

15 The invention will be better understood by way of the following detailed description of the preferred embodiments with reference to the appended drawings in which:

20 Figures 1, 2 and 3 are block diagrams of the preferred embodiment and the second and third embodiments respectively;

 Figure 4 is a functional block diagram of the major system components of the invention;

25 Figure 5 is a block diagram of typical subscriber premise equipment showing interconnection with the television and telephone systems;

 Figure 6 is a detailed plan view of a subscriber hand held remote control device;

30 Figure 7 is a functional block diagram of the major components of the customer premise equipment used to practice the invention;

 Figure 8 is a high-level data flow diagram of the process which operates the customer premise apparatus;

35 Figure 9 is a functional block diagram of typical elements of a response center; and

Figure 10 is a functional block diagram of the major elements of a television signal encoder of the present invention.

5

For ease of understanding of the present invention, the user control unit 210, the TV receiver or tuner 214, the TV signal decoder 216a, b or c, the auto dialer 240, and the communication control means 224 are illustrated as separate interconnected components, whereas in the described embodiments of the present invention, they would be physically mounted within a single housing in a TV set top box known as customer premises equipment (CPE). The CPE is plugged into the cable TV coax cable 212, the telephone network 220 and the television unit 218. A remote control unit 234 is provided which communicates to the control unit 210 by infrared signaling. The CPE typically comprises an inexpensive microprocessor with minimal memory and its control program stored in non-volatile memory.

The control unit 210 receives the viewer commands from the remote control 234 for the purposes of controlling channel selection, on/off and possibly volume control. In accordance with the invention, there is provided an inquire button 236 which signals to the CPE that the viewer wishes to obtain information regarding what is being viewed on his or her TV screen 218.

In the preferred embodiment illustrated in Figure 1, when the inquire button 236 is pressed, the TV signal decoder 216a proceeds to send decoded digital information from the VBI of the television signal being viewed to control means 224. Digital information is continuously retrieved from the VBI and stored in memory. In the preferred embodiment, the

communication means 224 places on TV screen 218 text prompting the viewer to confirm the inquire selection. The prompt contains specific text which was recovered from the VBI. For example, if the program being
5 viewed is a travelogue on Portugal, the-recovered data may include a toll-free number for a travel service dedicated to planning holidays in Portugal, and the recovered data may include text for the words "your vacation in Portugal" such that the text message
10 displayed on TV 218 may read "Inquire about your vacation in Portugal?". The text may be superimposed on the TV program being viewed or replace the viewed program. At this point, if the control unit receives a cancel or confirmation button press, the result is
15 communicated through the unit 216 to the means 224. If the inquire function is confirmed, means 216a signal the telephone number to be called to the auto dialer 240 in order that the information service 222 may be contacted over the telephone network 220. The
20 communication means 224 then relays the information from the information service 222 to the viewer. If the information service 222 is a voice information service, the voice call may be handled either using telephone handset 238, or the speakers of the
25 television 218 may be used to communicate sound from the information service while a microphone 239 in the CPE is used to pick up the viewer's voice and relay it over the telephone network 220 to the information service 222. If the information service 222 is a data
30 information service, the communication means 224 includes a modem circuit and a graphics character display circuit for displaying on TV 218 information obtained from the information service while accepting control commands from remote control 234 for relaying
35 to the information service in order to provide a menu driven text communication system.

When the information recovered from the VBI is complete as to the telephone number to be dialed, the system may operate from a recorded television signal source, such as from a video cassette recorder (VCR),
5 or from broadcast video (either by satellite or by ground station). In this case, the signal being passed through the receiver 214 originates from a source other than CA TV cable 212 as shown.

When the amount of data regarding the information
10 service associated with the program being viewed is desirably greater than what can be efficiently transmitted in the VBI, the data encoded in the VBI may be a small serial number identifying the information service and program, instead of the actual
15 description and telephone number data. In this case, when the inquire button 236 is depressed, a predetermined local telephone number of a connection data base server 226 is dialed by the auto dialer 240. When connected, the serial identification number from
20 the VBI is sent by means 216a to server 226 either by DTMF tones or by modem signal. The server 226 then returns data relating to the proper telephone number to be dialed and, optionally, data relating to the identification of the information service 222 which
25 has been identified by the serial number. This optional data is passed on to means 224. The communication means 224 then prompt the viewer to confirm connection to the information service. If the response is positive, the PSTN number is given to the
30 auto dialer 240 so that the number of the information service 222 may be dialed and then the communication means 224 takes over communication between the information service 222 and the viewer, as discussed above.

35 In this embodiment, it is possible that the connection data base server be integrated within the switch at the PSTN 220 whereby the connection between

the communication means 224 and the network 220 is maintained until the communication means 224 signal to the network 220 whether or not communication with the information service is desired. If this is confirmed, the switch in network 220 automatically connects communication means 224 to the desired information service 222. In this latter case, the connection data base service need not return the actual PSTN number to the communication means, and of course, it would be possible to connect the viewer to the information service without any confirmation.

In the embodiment illustrated in Figure 2, the connection data base server 226 is provided with more information regarding the programming viewed on the channels carried by the cable TV service. When the viewer presses the inquire button 236, data transmitter 216b signals auto dialer 240 to dial the predetermined PSTN number of the server 226 sending to it the channel number and the time when the inquire button was pressed. The connection data base 226 determines from its up-to-date, accurate schedule of programming which information service was associated with the channel when it was being viewed and returns to the communication means 224 the appropriate telephone number and any associated identification data. At this point, the communication means 224 confirms with the viewer whether he or she wishes to contact the information service in question while the auto dialer is caused to hang up its connection to network 220. If the viewer responds to the prompt positively, the auto dialer 240 is caused to dial the number of the information service and the communication means 224 takes over communication as indicated above. In this embodiment, the connection data base server 226 is preferably owned and maintained by the cable TV service given that it must contain very accurate information about the

programming carried by the various channels on cable 212.

In the embodiment illustrated in Figure 3, the information concerning the number of the information service and associated identification data relating to the information service is not carried in a non-visual part of the television signal or contained in a remote data base, but rather, a dedicated channel on cable 212 carries the data relating to the information service associated with the program being viewed on the various channels. In the embodiment shown, pressing the inquire button 236 causes the control unit 210 to signal to the receiver 214 to switch to the data channel and provide a data channel decoder 216c with the information carried on the data channel as well as the channel number which was being viewed. Within a brief period of time (less than 2 seconds), the data channel decoder recovers the information for all channels and selects the information pertinent to the channel being viewed. During this brief interval, a blank screen is presented to TV 218 by the receiver 214. The receiver 214 then returns to the channel being viewed. The recovered data is sent to the communication means 224 which provides the query text to the viewer. When the viewer confirms that connection to the information service is desired, the PSTN number of the information service is dialed by the auto dialer 240 and the communication means 224 is connected to the information service 222. The communication means 224 then assumes the role of relaying information between the viewer and the information as described above.

In the embodiment illustrated in Figure 3, there is only one data channel associated with all viewable video program channels and the data channel decoder is provided with the number of the television channel being viewed. It would alternatively be possible to

provide a data channel on the cable 212 to be associated with each video program channel able to be associated with an information service. In which case, the TV receiver 214 would tune to the
5 appropriate data channel and provide the data channel decoder 216c with the right data channel and the data channel decoder would merely extract the telephone number and any text data on the data channel. Such a
10 data channel could be of a bandwidth narrower than a bandwidth of a conventional cable TV channel. It is furthermore possible to tune to such a data channel by using a separate tuner without interrupting the program being viewed on TV 218.

As can be appreciated, the communication control
15 means 224 can be used to place audio from the information service onto the speakers of TV 218 by inserting the audio into the video signal audio track within TV receiver means 214. If the handset 238 is picked up, this audio path to TV 218 and the
20 microphone 39 may be disconnected in favor of more private communication using handset 238. In the embodiment of Figure 1, data is continuously removed from the vertical blanking interval. Since the amount of data that may be inserted into the vertical
25 blanking interval in a brief period of time is limited, it may take a few seconds for the appropriate quantity of data to be removed from the VBI. Accordingly, as data on the VBI regarding an information service is recovered, it is stored in
30 memory within the decoder 216a. Preferably, this data is sent a little in advance such that at the moment in the program when the viewer is reminded that additional information may be obtained from a remote information service, data has already been recovered
35 and can be immediately applied if the inquire button is pressed. If the viewer changes channels, new VBI data from the new channel automatically replaces the

old recovered data. As long as one is viewing a program long enough to recognize what a product is or what an information service may be able to provide, the appropriate recovered data from the VBI should be
5 available in the memory of decoder 216a to permit connection to the information service.

An aspect of importance to this system is for the VBI decoder 216a to be able to recognize a valid telephone number in the VBI. For example, decoder
10 216a may decode data within the VBI according to a particular encryption protocol such that only information service data authorized by the cable company is properly decoded and made available for use.

15 According to a further aspect of the present invention, a code may be sent in the VBI following complete transmission of information service data for the purposes of providing the viewer with an indication that automatic connection to the
20 information service is available. When the code is received in decoder 216a, a control signal is sent to means 224 to indicate to the viewer that the inquire function is operational and that the viewer may be quickly and automatically connected by pressing the
25 inquire button. The indication to the viewer may be provided by presenting, for a short period of time, a graphic symbol or some text signaling that the recovered information is available for use. Such an automatic display or prompting feature may be one
30 which the viewer can disable using remote control 234.

The communication means 224 and the information service 222 have been described above as being for voice or data. The communication between the viewer and the information service may, of course, be a
35 mixture of both, for example, it may involve an initial data communication whereby the viewer selects from one or more menus specific options about the

information desired. An option may be within the menu system to speak with an operator as a matter of preference or for the purposes of obtaining information not available from the menus.

5 While the invention has been described up to now with the auto dialer 240 as a separate unit from data transmission components of units 216 and 224, it can be understood that a conventional modem unit comprising an auto dialer circuit would combine data
10 transmission functions and auto dialing functions in one physical device.

Referring now to Figure 4, which is a functional block diagram of the major system components of the invention there is shown the television broadcast
15 portion of the system which can take any suitable method employed to distribute television signals. By way of example, two broadcast methods are depicted, the first being a national broadcast emanating from a TV earth station 10 which communicates the television
20 programming to a satellite 12 for relay back to satellite receivers (not shown) throughout the radiation foot print of the satellite 12. The satellite broadcast TV signal is provided with system data that is encoded into the vertical blanking
25 interval (VBI) of the television signal by means of a VBI encoder 16. The television signal can be represented by either the 525 line or 625 line broadcasts commonly available today referred to in the television industry as NTSC (being the television
30 signal commonly transmitted using 525 lines in areas where 60 Hz electrical power is used such as North America) or PAL SECAM (being the television signal commonly transmitted using 625 lines in areas where 50 Hz electrical power is used such as Europe).
35 Similarly, the system of the present invention can be applied to currently contemplated HDTV digital television signals and the various digital coding

schemes such as MPEG-1 and MPEG-2 by providing the data encoding as a data burst in the digital data stream with a suitable header to permit recovery of the data.

The satellite broadcast TV signal may be received
5 by:

receivers provided at the customer premises for direct reception by the person viewing the television programming or

a cable television system that will re-transmit
10 the satellite broadcast TV signal to the subscribers of the cable system or

a local broadcast station that will re-transmit the satellite broadcast TV signal of views in the receiving area of the local television station.

15 In all cases, the system data for operation of the present system, which is encoded in the vertical blanking interval of the satellite broadcast TV signal, will arrive at the customer premises intact. The system data is recovered by each member of the
20 television audience (subscriber) by the customer premises equipment (CPE) 14.

A second method of television broadcast is shown, namely, a local broadcast radiating from a TV broadcast tower 18 to subscribers in the receiving area. The
25 local broadcast television station is again provided with an encoder 16 to encode system information in the VBI of the broadcast signal that is recovered by each subscriber having a CPE 14 for recovery of the system data.

30 Common in households today, the television programming being received may be recorded on a video cassette recorder (VCR) 15 for later playback and viewing by the subscriber. The data encoding including data rate and encoding method of the present system are
35 selected to be recorded by the VCR to enable the data to be recovered by the CPE when the pre-recorded programming is played back on a subscriber's VCR.

The subscriber initiates interaction with the system of the invention by depressing a key on the hand held wireless remote control 34 of Figure 6 as will be explained in more detail subsequently and the result of the subscriber interaction with the system is to cause a telephone call to be placed outbound from the subscriber premises by the CPE 14 which telephone call is processed by the public switched telephone network (PSTN) 20 and is directed to a system call response center 22. Three examples of which 22a, 22b, and 22c are shown in Figure 4.

The telephone call can be to a voice response center 22a that allows the subscriber to talk to a person at or leave a message with the response center. Alternately, the subscriber can interact with a data service provided by the response center. Two examples of configurations of a data service response center are shown in Figure 4. As one example, the subscriber can place a telephone call to a response center that has computers attached to the PSTN 20 which interact with the subscriber using the Analog Display Services Interface (ADSI) which is a public data communications standard for PSTN's that has been defined by BELLCORE (SR-INS-002461, Customer Premises Equipment Compatibility Considerations for the Analog Display Service Interface, Issue 1, Bellcore, December 1992. See also TR-NWT-000030, Voice band Data Transmission Interface Generic Requirements, Issue 2, Bellcore, October 1992). A response center of this type is shown in Figure 4 as an IVR/ADSI SERVER 22b. Output back to the subscriber from the server 22b can be in the form of text which is displayed on the subscriber's television set or may be in the form of audio output that is heard over the subscribers television set (interactive voice response IVR). In the case of the audio output, the subscriber interacts with the voice response server by depressing buttons on the control

device 34 (of Figures 5 and 6). Alternately, depending on the service configuration selected by the service provider, the subscriber's call can be placed over the PSTN 20 through the telephone operating company's central office (CO) 24 which will route the call through the public X.25 packet data network 26 to an information and data service indicated as a SERVER 22c. The content of the data communications is completely defined by the service provider and may include text, dual tone multi-frequency (DTMF) tones or other suitable data communications interactions.

Referring now to Figure 5 which shows typical subscriber premise equipment used in accordance with the invention, the subscriber's first point of contact with output from the system is by viewing of television programming on the subscriber's television set 28. The programming arrives at the subscriber premises, shown by way of example, over the cable television network (CATV) system 30. The originating programming on the television broadcast is encoded using the encoder 16 which provides the data that will be decoded at the subscriber premises on the customer premise equipment (CPE) 14 and may be shown on television programming being viewed by the subscriber on the television set 28. As may be appreciated from the description of the subject system with reference to Figure 4, the CATV system 30 is shown by way of example only. The subscriber could be receiving the TV programming as a local broadcast or via a satellite transmission. In all type of reception of television programming by the subscriber, the present system is adapted to carry the information encoded on the TV broadcast by encoder 16 to the customer premise equipment 14 located at the subscriber premises.

The originating television programming is generally depicted by reference numeral 32 and includes both live broadcasts and pre-recorded broadcasts of

audio-visual entertainment as well as advertising spots and all manner of television broadcast programming that originates from a television broadcaster. The encoding of the data in the television signal broadcast in accordance with the present invention is encoded in such a manner and at such a data rate as to permit the data so encoded to be recorded on a consumer video cassette recorder (VCR) 15 whereby a television program recorded by the subscriber for viewing at another time by playback on a VCR still contains all of the data and encoding of the system in accordance with the original broadcast without the need or requirement for any type of change, modification or other attachment or enhancement to standard consumer VCR equipment.

The system of the present invention is particularly adapted to provide dial-out coding in the vertical blanking interval of the television signal by means of encoder 16 at the time of broadcast (or as previously recorded at the broadcaster's studio) whereby the dial-out information is received by the subscriber customer premise equipment 14 and a communication session over the PSTN 20 may initiated by the subscriber when viewing the television programming, so encoded, on the television set 28 by depressing appropriate keys, shown by way of example as the "Buy" key on the wireless remote control 34. The wireless remote control signals user interaction to the customer premise equipment 14 by means of a control signal 36. Suitable control signals include radio, ultrasound and infra-red control signals. The customer premise equipment will receive the control signal 36 and respond to it in the manner described in more detail hereafter. A typical response to subscriber interaction would be to place a telephone call over the PSTN 20 to the corresponding response center shown generally by reference numeral 22.

There are primarily 2 types of interaction that can take place between the subscriber and the response center 22. In a voice type of interaction, the dialing over the PSTN by the customer premise equipment is done to establish the communications link between the subscriber and the voice response center 22a. The subscriber communicates with the voice response center 22a using the telephone hand-set 38 located at the subscriber premises. In this use of the system, the dialing information encoded in the vertical blanking interval of the television signal is used simply to establish a communications link and simplify this tedious step in the communications setup. Such information would typically include the target telephone number and some type of product or service identifier relating the nature of the product or service being advertised. The customer premise equipment would place a call into the telephone network 20 using the dial number information decoded from the television signal and, as the call will be a voice based call, the product information contained in the television signal may or may not be transmitted to the target response center depending on the nature of the call processing equipment (typically referred to as automatic call distribution or ACD systems in the trade) in place at the response center.

Alternately, the interaction established between the subscriber and the response center 22 could be a data communications type of dialog and there are several options in the type of communications protocol that the response center can have for connection to a data network to carry out the data communications with the subscriber. There are shown two examples of typical response center configurations 22b or 22c that can be used to advantage in the present system. In all cases though, the communication from the response

center to the subscriber is data or audio (i.e. pre-recorded or interactive voice) based.

Where the communication from the response center is data based, the data is interpreted by the customer premise equipment 14 and displayed for the subscriber to read on his television set 28.

Where the communication from the response center is audio, the audio communication is played back for the subscriber to hear over the speaker system of the subscriber's television set. Subscriber communication to the response center will occur when the subscriber depresses keys on the wireless remote control 34 and will normally be data based using the DTMF encoding of the ADSI standard referred to with reference to Figure 4. Examples of the interaction between the subscriber and the response center will be exemplified in more detail with reference to subsequent drawings.

Referring now to Figure 6 which illustrates a detailed plan view of a subscriber hand held wireless remote control device in accordance with the system of the present invention, the control device 34 is preferably a hand held remote device which produces a control signal 36 that the CPE unit 14 is responsive to. The control device could be integral to the CPE or a separate hand held remote device attached to the CPE 14 by a wire adapted to carry the control signal thereover. Having considered the variations possible for the control device 14, it is preferable to have a control device which is not connected to the CPE by being physically integral thereto or connected by wires, but rather communicates user selection of the command buttons shown in detail in Figure 6 by means of a wireless control signal 36. The wireless control signal in the embodiment shown is an infrared light beam emitted out of light emitting diodes (not specifically shown) contained within the hand held unit. This manner of wireless control of consumer

electronic items such as stereos and TVs—is common and quite well known in the art. Each labeled button on the control device 34 causes a control signal 36 to be emitted that will be received by the CPE unit 14 and

5 acted on by:

initiating data dialog on or interaction—with the telephone service shown in the table below—under the "Active" column as phone; or

10 activating a display on the TV 28 or operating on the audio sound coming out of the TV 28 shown in the table below under the "Active" column as TV.

Depressing the buttons of the control will produce a responding function in the CPE unit 14 described in summary in the following table.

15

Name	Function	Active
1	Output representation of character one	TV & phone
2abc	Output representation of character two	TV & phone
3def	Output representation of character three	TV & phone
4ghi	Output representation of character four	TV & phone
5jkl	Output representation of character five	TV & phone
6mno	Output representation of character six	TV & phone
7prs	Output representation of character seven	TV & phone
8tuv	Output representation of character eight	TV & phone
9wxy	Output representation of character nine	TV & phone
0	Output representation of character zero	TV & phone
*	Output representation of character asterisk	Phone
#	Output representation of character octothorp	Phone
	Change channel to previously viewed channel, display channel number	TV
Channel ^	Increment the channel, display channel number	TV
Channel v	Decrement the channel, display channel number	TV

Volume ^	Increase volume, display volume_graph	TV & Phone
Volume v	Decrease volume, display volume_graph	TV & Phone
Buy	Initiate purchase transaction	TV & Phone
Mute	Turn off sound, display "MUTE"	TV & Phone
TV/Phone	Toggle display and audio between TV and Phone	TV <> Phone
Menu	Toggle display between TV and Text	TV
Clear	Clears display of all telephony text	TV & Phone
A	Output representation of first soft key	Phone
B	Output representation of second soft key	Phone
C	Output representation of third soft key	Phone
D	Output representation of fourth soft key	Phone
E	Output representation of fifth soft key	Phone
F	Output representation of sixth soft key	Phone
^	Scroll active line down screen display to Null line or Bottom	Phone
v	Scroll active line up screen display to Null line or Top	Phone
>	Replace primary column text display with secondary text display	Phone
<	Replace secondary column text display with primary text display	Phone

Table 1

By depressing the buy button, the subscriber initiates a purchase transaction using the system of the present invention. Where the subscriber is viewing a television broadcast that has response center data contained in the television broadcast, the system will respond by placing an outbound call to the response center targeted in the broadcast. The response center targeting may be by the encoded television broadcast having the target telephone number itself coded in the

broadcast which the customer premise equipment will have decoded and a call will be placed to that telephone number. Alternately, the broadcast may provide response center identifying information which will cause the customer premise equipment to place a call to a predetermined number, such as a registration database whereupon the database service will place the actual telephone call to the response center and provide a direct connection to the subscriber or collect the information from the subscriber for passing it along to the goods and service vendor in a batch.

Referring now to Figure 7, we are shown a detailed functional block diagram of the major components of the customer premise equipment (CPE) 14. The unit is provided with several external inputs and outputs which are as follows.

Telephone outlets, such as RJ11 or RJ45 jacks, are provided for interconnection with the telephone network. A first telephone outlet 40 is provided for interconnection of the unit with the public switched telephone network 20 (of Figure 7) and a second telephone outlet 42 is also provided on the unit for the convenience of the subscriber who may use outlet 42 to attach a telephone handset 38 (of Figure 5) to the unit if desired. The customer premise unit is further provided with a television signal input 44 for reception of TV programming. Output to the subscriber's television set is accomplished by providing a TV outlet 46 which is modulated to Channel 2, Channel 3 or Channel 4 depending on the setting the subscriber makes to the channel preference switch 62. The modulated channel output provided on TV outlet 46 includes both visual and audio outputs that will appear on the television screen and over the TV speakers in the customary fashion for broadcast television signals. The audio output to the television through outlet 46 can be taken from either the audio delivered with the

user selected channel being viewed or the audio received from the telephone network 20.

The CPE unit is provided with a television tuner 64 which provides a separated audio output over line 48 and a base band video signal output over line 91. The audio signal and video signal placed on the respective lines are the signals received by the tuner on the cable broadcast channel selected by the user for viewing. The audio signal is delivered to an audio control unit 54 which contains an analog switch and electrically erasable volume control (E2Vol). The audio control unit 54 is provided with 2 audio inputs, one connected to the TV audio line 48, the other connected to telephone audio line 50 which delivers audio signals received by the CPE unit from the telephone network. The analog switch of the audio control 54 is set, in accordance with instructions received from the microprocessor 66 over the processor peripheral control bus 68, to select the audio signal received over the telephone audio line 50 or the TV audio line 48. The selected audio signal is then scaled by the electrically erasable volume control (E2Vol) to a user set amplitude (which may be varied by the user in accordance again with the control commands received by the E2Vol over the processor peripheral control bus 68). The scaled audio signal is then delivered to the tuner 64 over the output audio line 52. Within the tuner 64 the audio signal received on the output audio line 52 is modulated into the video signal delivered to the subscriber's television through the TV output line 46. A suitable tuner for incorporation into the CPE unit is manufactured by Sharp and is available under part number RFS07US3.

The base band video signal tuned by tuner 64 is placed on line 91 where it is distributed to the VBI decoder 93 and the On Screen Display Memory 90.

The CPE unit is also provided with a control signal receiver 60 which is used to receive commands from the subscriber as encoded on the control signal 36 detected by the control signal receiver 60. In the preferred embodiment, infra red signaling is used as a reliable, readily available method of providing wireless communication between the hand held wireless remote control device 34 and the CPE unit. The received signaling is converted to digital electrical signaling that is communicated to the microprocessor over the digital subscriber control line 80. A suitable device for implementing the functions of a control signal receiver is the IR receiver manufactured by Sharp under part number GP1U7ZQ.

Telephone interface 70 processes the telephone signaling present on the telephone input 40 or 42 which is used for all manner of communication between the CPE unit and the public switched telephone network. The interface 70 can go on-hook, off-hook, detect ringing and generally provide all the necessary line monitoring, filtering, isolation, protection and signal conversion functions for connection of high performance modems to the public switched telephone network. A suitable telephone interface is manufactured by Silicon Systems under part SSI 73M9001. In addition the telephone interface is also provided with an audio output port which is connected to telephone audio line 50 and is used to deliver voice band signaling, typically voice response audio, to the tuner as described previously. The on-hook, off-hook, ring-detect etc. state of the telephone line is communicated to the microprocessor over the telephone control line 74 thereby enabling the microprocessor to exercise control over the telephone signaling originating from or terminating at the CPE unit. Data communications are exchanged between the modem 72 and the telephone interface 70 over the analog data bus 76. The function

of the modem 72 is to convert the digital data needed by the microprocessor 66 to the voice band analog data needed for transmission over the public switched telephone network. A suitable modem for use in the present system is manufactured by Silicon Systems under part number SSI 73K312L. Data transmitted or received by the modem 72 are communicated to the microprocessor over the digital telephone data bus 78.

Microprocessor 66 obtains program and certain messages and interactive text by communication with an electrically erasable programmable read only memory (EEPROM) 82 via the EEPROM addressing and data bus 84. The control program operating the microprocessor will be explained in greater detail in relation to Figure 8. The microprocessor itself will contain read only memory (ROM) for storage of frequently used portions of the control program detailed in Figure 8 and random access memory (RAM) for storage of changing information such as volume levels etc. for use in its operation. In selecting an external memory 82 microprocessor 66 pair for use in the system, it is preferable that as little addressing and data traffic as possible appear on the bus 84 to minimize unwanted interference being produced in the video signaling delivered by the CPE unit out of TV outlet 46. It is advantageous to use the 87C552 microprocessor manufactured by, for example Phillips Semiconductors under the Signetics product line which is provided with 8 kilobytes of ROM and of 256 bytes of RAM.

The CPE unit is also provided with an On Screen Display 90 having a base band input port connected to the base band video line 91 and a memory that provides a text storage area accessible by the microprocessor 66 for use as a scratch pad area for placing text and graphics that are to be displayed on the subscriber's television set 20. Text or graphics to be displayed are placed on the processor peripheral controller bus

68 and placed in memory in the On Screen Display 90. The microprocessor determines when the conditions are met to display the On Screen Display 90 contents on the television set and directs the on screen display memory
5 90 to overlay or replace the television programming emitted from the tuner over base band video line 91 with the data obtained from the On Screen Display 90 as provided to the tuner over the display memory base band video output line 92. An on screen display memory unit
10 that may be advantageously used in the apparatus described herein is manufactured by NEC under part number PD6450.

The VBI decoder 93 of the CPE continually monitors the vertical blanking interval of the television signal
15 tuned by the subscriber by having its base band video input port connected to the base band video line 91 output from the tuner 64. By standard and convention, the vertical blanking interval of the television broadcast is represented by horizontal scanning lines 1
20 through 21 of the broadcast television signal and fuller discussion of the content of the vertical blanking interval is made in EIA-516 (Joint EIA/CVCC Recommended Practice for Teletext: North American Basic Teletext Specification (NABTS) where discussion of the
25 525-line 60 fields-per-second includes lines 1 - 21 of the field blanking interval, lines 1-9 of which are not usable for data as they contain vertical synchronization pulses). The NABTS standard is possible but not preferable for encoding the data of
30 the present invention as the data rate of 288 bits per line requires a clock rate of 5.727272 MHz which is a clock rate that is too fast to be reliably recorded on consumer VCRs. But the NZR (non return to zero) analog coding of the binary data to be transmitted in the
35 television signal in the system of the present invention as described in the NABTS standard is a useful and preferable analog modulation scheme compared

to other analog modulation schemes such as quadrature phase modulation simply because the cost of recovering binary data from NRZ analog modulation is very inexpensive relative to recovering the binary data from a quadrature analog modulation. As described previously, a lower data rate is selected to provide an optimal data rate or speed that permits reliability in recovering the data from a worst case television signal recording which would include recovering the data from a program recorded on dirty and stretched VCR tape. Moreover the data must be encoded in the remaining lines of the vertical blanking interval to permit cascading. That is to say, the data must be reliably carried on the various terrestrial and satellite distribution systems and ultimately arrive at the subscribers premises intact. In North America, this eliminates line 21, for example, as that line is commonly used for providing closed captioning text to subscribers for the hearing impaired. A lower data rate is specified in the EIA 608 standard which provides 32 bits (4 bytes) per horizontal scanning line capable of a 500 Kilobit per second data rate. The EIA 608 data rate and NRZ analog encoding is sufficient to meet the VCR storage requirements of the present system and it has been found that this rate can even be doubled to 1 Megabit per second with very reliable data recovery from consumer quality VCRs.

Once the data rate and VBI line location(s) is/are specified, there can be substitution of the information encoded in the vertical blanking interval in accordance with the system of the present invention to permit national, regional and local addition or substitution of information to suit the marketing needs of the service and goods provider authorizing the placement of dialing information. Thus the encoder 16 of Figure 4 not only encodes the information sought to be inserted into the vertical blanking interval, it must also be

capable of recovering the data to permit alternate data to be inserted for the purpose of enabling a national broadcast to provide regional or local data content in those receiving areas where such action is required. A
5 suitable VBI decoder 93 is manufactured by Norpak Corporation of Kanata, Ontario, Canada.

The data recovered from the vertical blanking interval is passed onto microprocessor 66 over processor peripheral control bus 68 and the processor
10 determines what action to take in respect of the received data as will be explained in more detail subsequently. The microprocessor 66 may respond to signaling from VBI decoder 93 by activating the on screen display memory 90 to overlay text information on
15 the video signal thereby alerting the subscriber viewing the TV programming to the fact that automatic dialing and connection to the service being described in the programming being viewed can be had by simply depressing the appropriate button on the hand-held
20 wireless remote control.

Referring now to Figure 8, there is shown a high-level data flow diagram of the process which operates the microprocessor 66 of the CPE unit 14. The process interfaces with the telephone interface 70 and modem 72
25 via a Modem Manager (PL) which denotes the Physical Layer compliant with the ADSI protocol (TR-NWT-001273, Generic Requirements for and SPCS to Customer Premises Equipment Data Interface for Analog Display Services, Issue 1, Bellcore, December, 1992 pp. 3-1 to 3-3)
30 defined by Bellcore. The Modem Manager transmits and receives data from the modem and passes that data up to the Frame Manager (DLL) which denotes the Datalink layer of the ADSI protocol (TR-NWT-001273, pp. 3-3 to 3-20). The Frame Manager is mandated to process the
35 data in accordance with the Bellcore specification. The Frame Manager in turn exchanges data with the ADSI Manager (MSG.L) which denotes the Message layer of the

ADSI protocol (TR-NWT-001273, pp. 3-20 to 3-26). The ADSI manager processes the data in accordance with the Bellcore specification. The Frame Manager (DLL) also exchanges information with the telephone carrier Local
5 Access Transport Area (LATA) Manager which passes information as required to the interface manager.

The VBI Manager is responsible for managing the data flow between the Interface Manager and the VBI decoder 93. On power-up and reset, the Interface
10 Manager instructs the VBI Manager to initialize and perform set-up functions on the VBI decoder 93 to ready it to monitor and receive information contained in the vertical blanking interval of the tuned TV signaling. During operation, the VBI Manager reacts to
15 microprocessor interrupts produced by the VBI decoder 93 to obtain and parse information decoded by the VBI decoder 93 and pass that information on to the Interface Manager as required to affect the on-screen display 90 for example.

20 The Interface Manager is responsible for the real time processing of the user commands received from the IR interface and acting on those commands to alter the On Screen Display 90, or adjust the TV volume level or audio source by adjusting the E2Pot 54 levels or change
25 the TV channel by issuing commands to the Tuner 64. The Interface Manager will also act on data received from the ADSI Manager and the LATA Manager to alter the On Screen Display 90 or carry out other functions.

Referring now to Figure 9, there is shown a
30 functional block diagram of a response center being a service provider having a computer server having an interactive voice response capability. Incoming subscriber calls to the response center's server arrive at a channel bank 100 which is a common element of a
35 telephone operating company's central office (CO) 24 of Figure 4. The channel bank 100 is a commonly available piece of central office equipment and is available from

any number of manufacturers such as Northern Telecom or AT&T. The channel bank 100 places incoming calls onto a T1 trunk where it is forwarded to a digital trunk processor (DTP) 102 and the inbound call is there
5 passed onto the interactive voice response (IVR) computer 22b system for processing. A suitable IVR computer system 22b can be simply a personal computer with appropriate voice response interface cards and suitable software such as IBM compatible personal
10 computers as are available in the market place or larger scale voice response systems such as an IBM R/S 6000 computer running IBM Direct Talk software and the like. The user interacts with the computer system by providing DTMF tones to the system as was explained
15 earlier in reference to Figure 2 and the IVR computer system 22b responds back to the user using pre-recorded voice information, or text information forwarded to the user in accordance with the ADSI standard. The computer system 22b of the response center can be
20 located on telephone company premises or may be located at a service providers premises and attached to the telephone company's PSTN 20 in the customary fashion.

The processing of Voice response calls by a response center is somewhat similar as the inbound
25 calls from the PSTN are forwarded to an operator that is standing by to take the call which is received by the operator directly or which may be dispatched to a plurality of operators by means of an automatic call distribution center (ACD) (not shown).

30 Referring now to Figure 10, there is shown a functional block diagram of an encoder which is used to encode and insert the data to be distributed in the television signal. The encoder 16 of Figure 4 is provided with a television signal input port 120 that
35 carries the television signal to a field-line synchronization circuit 121 that processes the television signal and detects the proper time when the

field line(s) that is/are to be encoded is/are present in the television signal input port and thereupon provides a start signal to the data encoder circuit 124 over timing signal line 123. Data encoder 124
5 commences encoding the data contained in data-work-area 126 upon receipt of the start signal over line 123 to produce an analog modulated signal on its output line 128 that is an analog representation of the data contained in the data work area 126. The data signal
10 on output line 128 is overlaid onto the television signal by modulator 130 outputting an altered television signal that is passed out of the encoder over output port 122. The television signal provided on output port 122 is the television signal that is
15 broadcast which provides the necessary telephone number information that forms the basis for operation of the system of the present invention. The data contained in the data work area 126 is capable of being modified to correspond to the needs of the television programming
20 incorporating the features of the present invention. By way of example, a computer 132 is shown which provides apparatus for operators of the system to communicate with the encoder 16 over a communications line 134 which is conveniently provided as an RS232
25 asynchronous serial communications line commonly available on computers such as personal computers.

While the invention has been described in terms of the embodiments illustrated, it should be clearly understood that the invention is subject to numerous
30 modifications and mechanical equivalents which do not depart from its scope as defined by the claims appended hereto.

CLAIMS

1. Apparatus for automatically connecting a television viewer to an information service via a telephone network, comprising:

a control unit for producing a control signal, said control unit having a viewer actuated button;

decoder means adapted to be connected to a tuned channel of a TV receiver receiving a television signal to be viewed by said viewer for detecting and recovering data encoded in a non-visual part of said television signal;

automatic dialing means for automatically connecting to said network and dialing a telephone number in response to said control signal, said telephone number being based on said recovered data; and

communication means for relaying information between said service and said viewer when connected to said network.

2. Apparatus for automatically connecting a television viewer to an information service via a telephone network, comprising:

a control unit for producing a control signal, said control unit having at least one viewer actuated button;

decoder means adapted to be connected to a tuned channel of a TV receiver receiving a television signal to be viewed by said viewer for continuously detecting and recovering data encoded in a non-visual part of said television signal;

automatic dialing means for automatically connecting to said network and dialing a predetermined telephone number in response to said control signal, said predetermined number being for a data server;

data transmission means for sending data based on said recovered data over said telephone network to said server, said server determining which information service should be connected to over said network based on said data sent, and for establishing further communication with said information service;

communication means for relaying information between said service and said viewer during said further communication.

3. Apparatus for automatically connecting a television viewer to an information service via a telephone network, comprising:

a control unit for producing a control signal, said control unit having at least one viewer actuated button;

means adapted to be connected to a TV receiver receiving a television signal for detecting a program channel viewed by said viewer;

automatic dialing means for automatically connecting to said network and dialing a predetermined telephone number in response to said control signal, said predetermined number being for a data server;

data transmission means for sending data based on said detected channel over said telephone network to said server, said server determining which information service should be connected to over said network based on said data sent, and for establishing further communication with said information service;

communication means for relaying information between said service and said viewer during said further communication.

4. Apparatus for automatically connecting a television viewer to an information service via a telephone network, comprising:

a control unit for producing a control signal, said control unit having at least one viewer actuated button;

means adapted to be connected to a TV receiver receiving a television signal for detecting a program channel viewed by said viewer;

data channel tuning means for tuning to a data channel of said television signal and for detecting and recovering data encoded in a signal of said data channel;

automatic dialing means for automatically connecting to said network and dialing a telephone number in response to said control signal, said telephone number being based on said recovered data; and

communication means for relaying information between said service and said viewer when connected to said network.

5. A method for recovery of data in a television signal including the steps of:

(a) receiving a television signal including data encoded in a non-visual portion thereof;

(b) processing the television signal to recover the data encoded therein;

(c) storing the recovered data;

(d) at the indication of a subscriber, placing a telephone call into the telephone network using the recovered data as the dial number of the call to be made.

6. A method as claimed in claim 5 wherein storing the recovered data encoded in said television signal occurs periodically to keep the stored data current.

7. A method for distribution of data in a television signal including the steps of: